

**FIG 1**

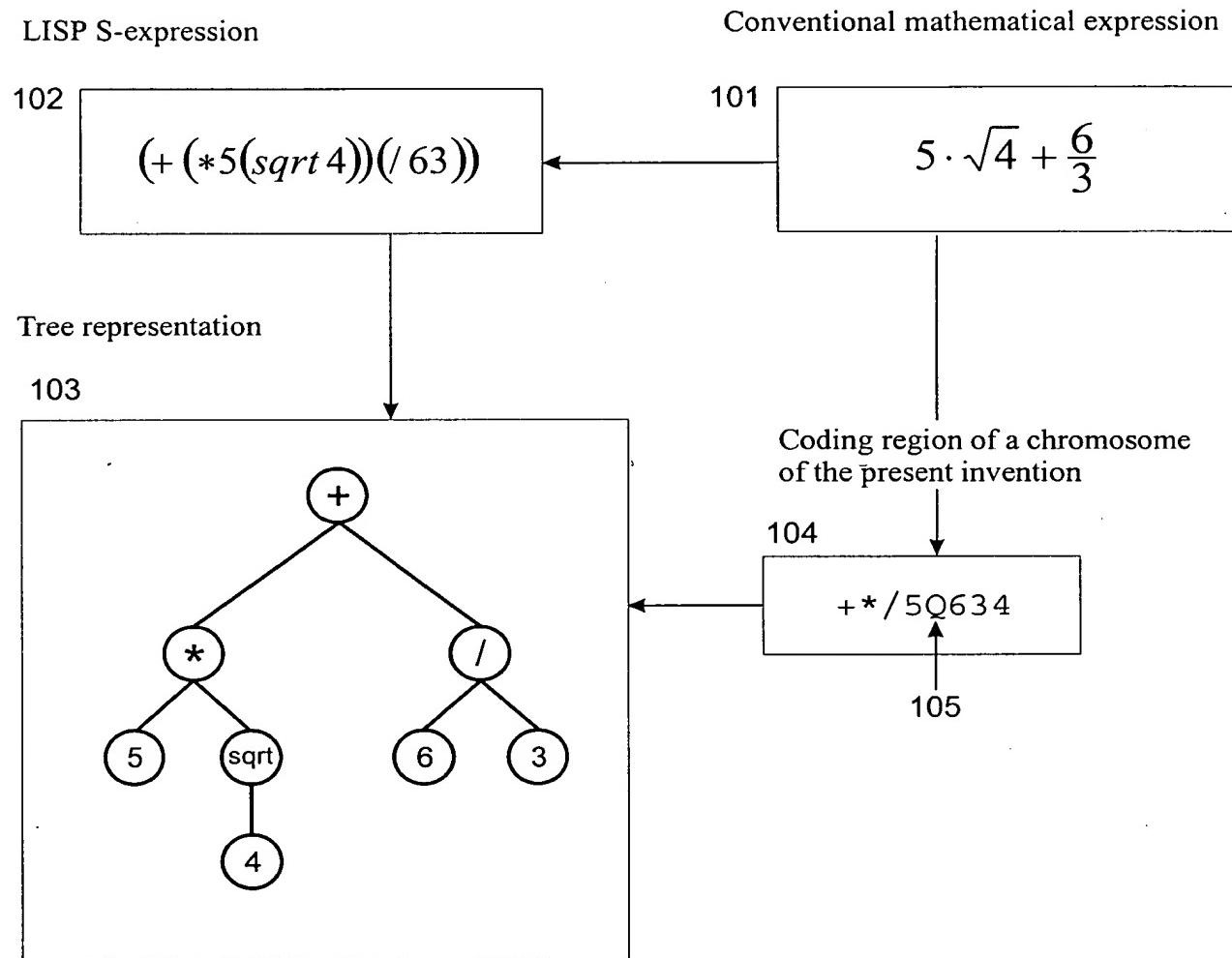
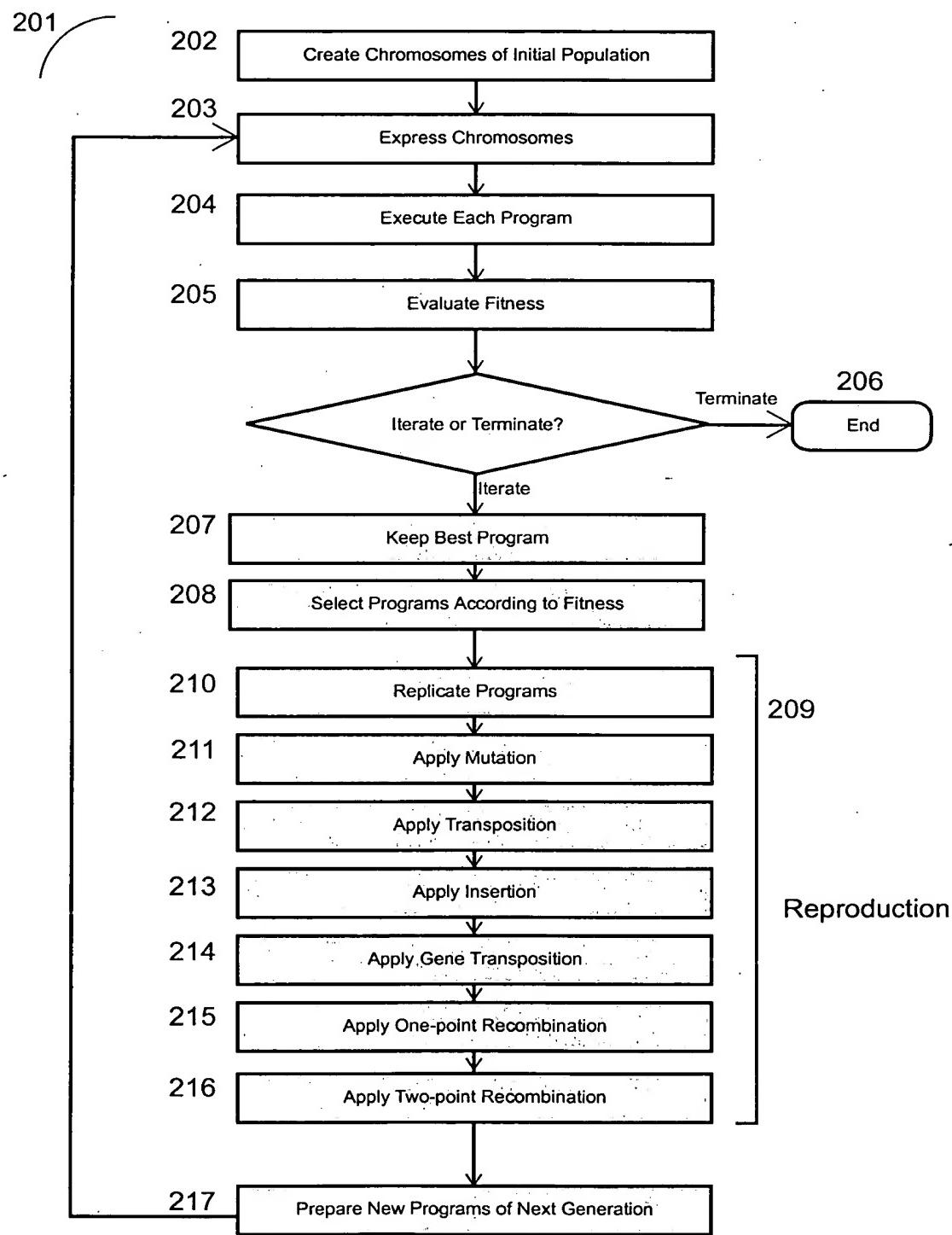


FIG 2



**FIG 3**

305            306            307            308            309            310  
 h1            t1            h2            t2            h3            t3  
 301            Q+aabbbaab\_\*----babbaa\*/b-bbaaaa  
 gene 1            gene 2            gene 3  
 302            303            304

FIG 4

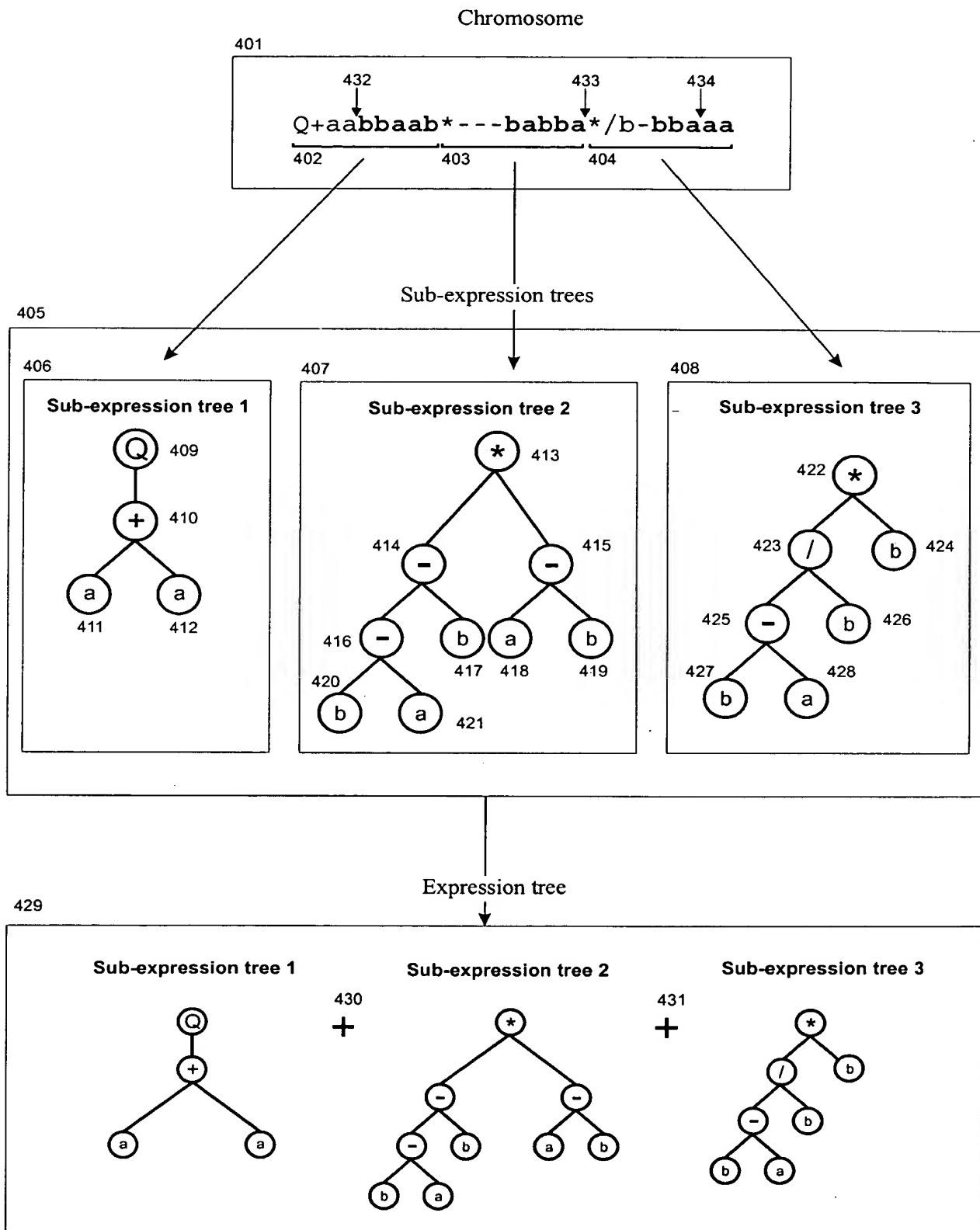


FIG 5

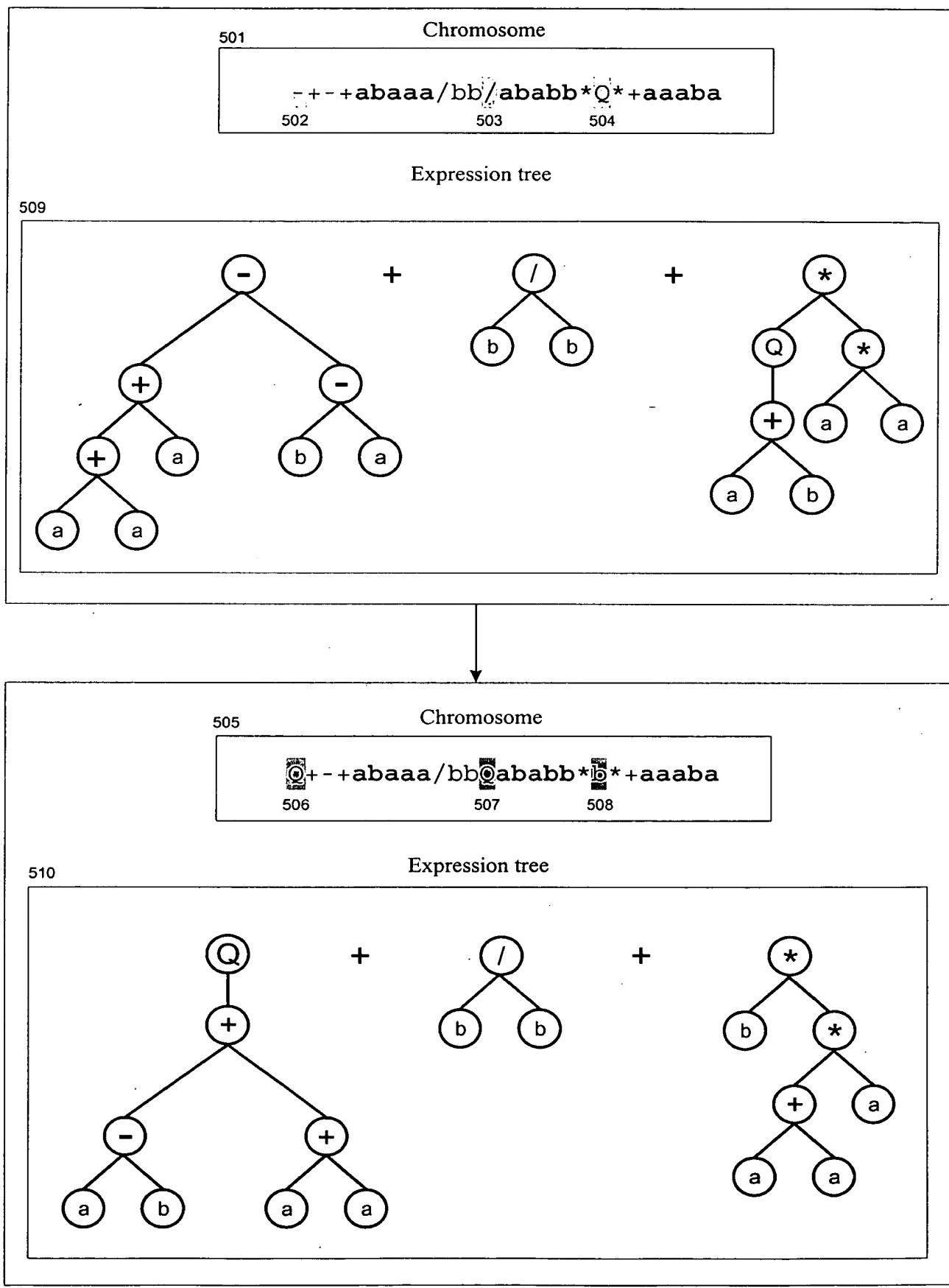


FIG 6

601

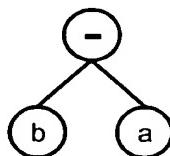
Chromosome

602  
 $-ba * + - + -Q / abababbbaaaQ * b / +bbbabbaaaaaaaaabbb$

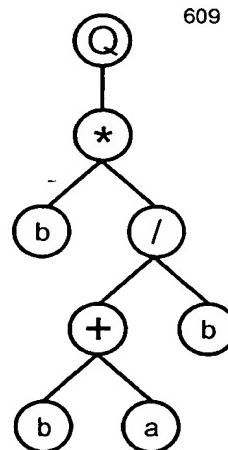
gene 1 605

gene 2 606

Expression tree



+



603

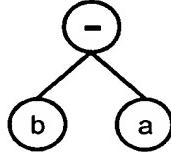
Chromosome

604  
 $-ba * + - + -Q / abababbbaaa +bbQ * b / +bbbabbaaaaaaaaabbb$

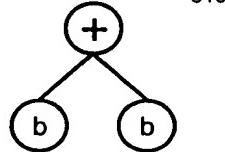
gene 1' 607

gene 2' 608

Expression tree



+



610

FIG 7

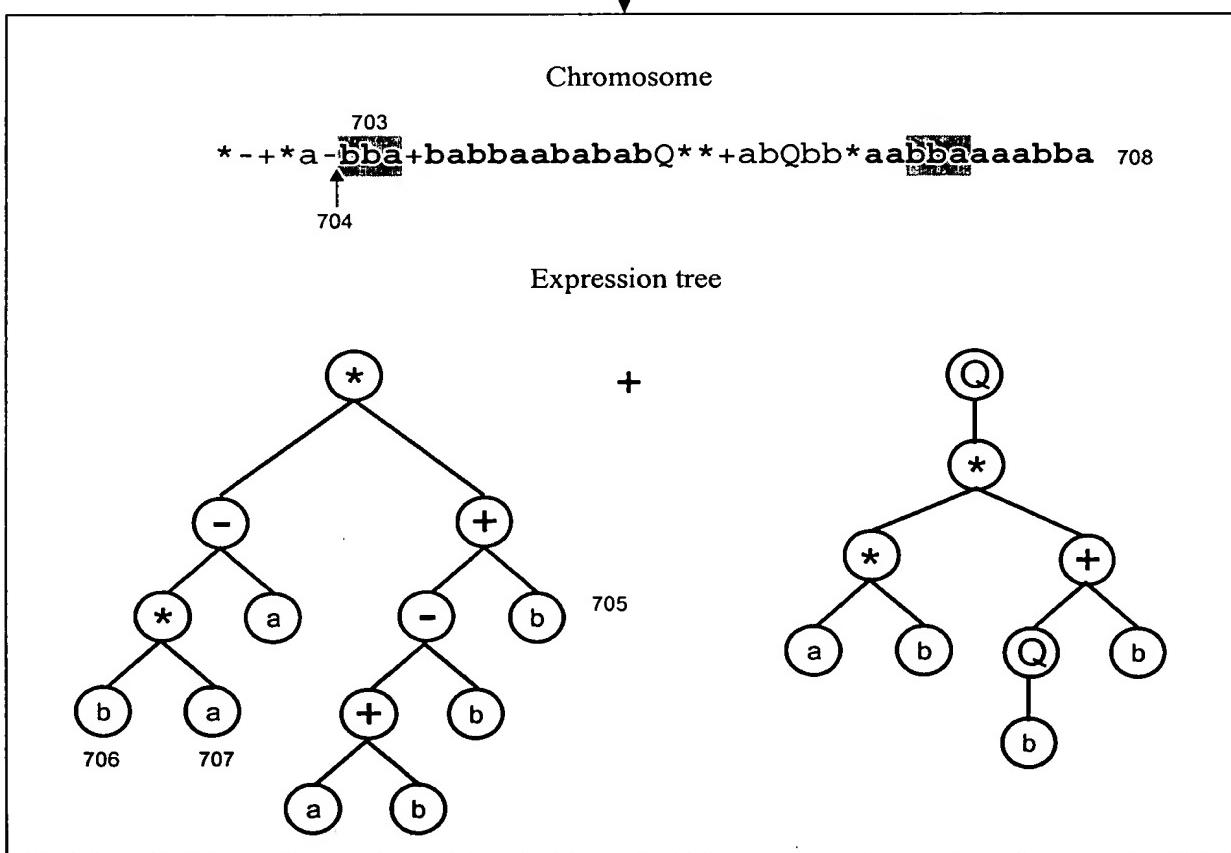
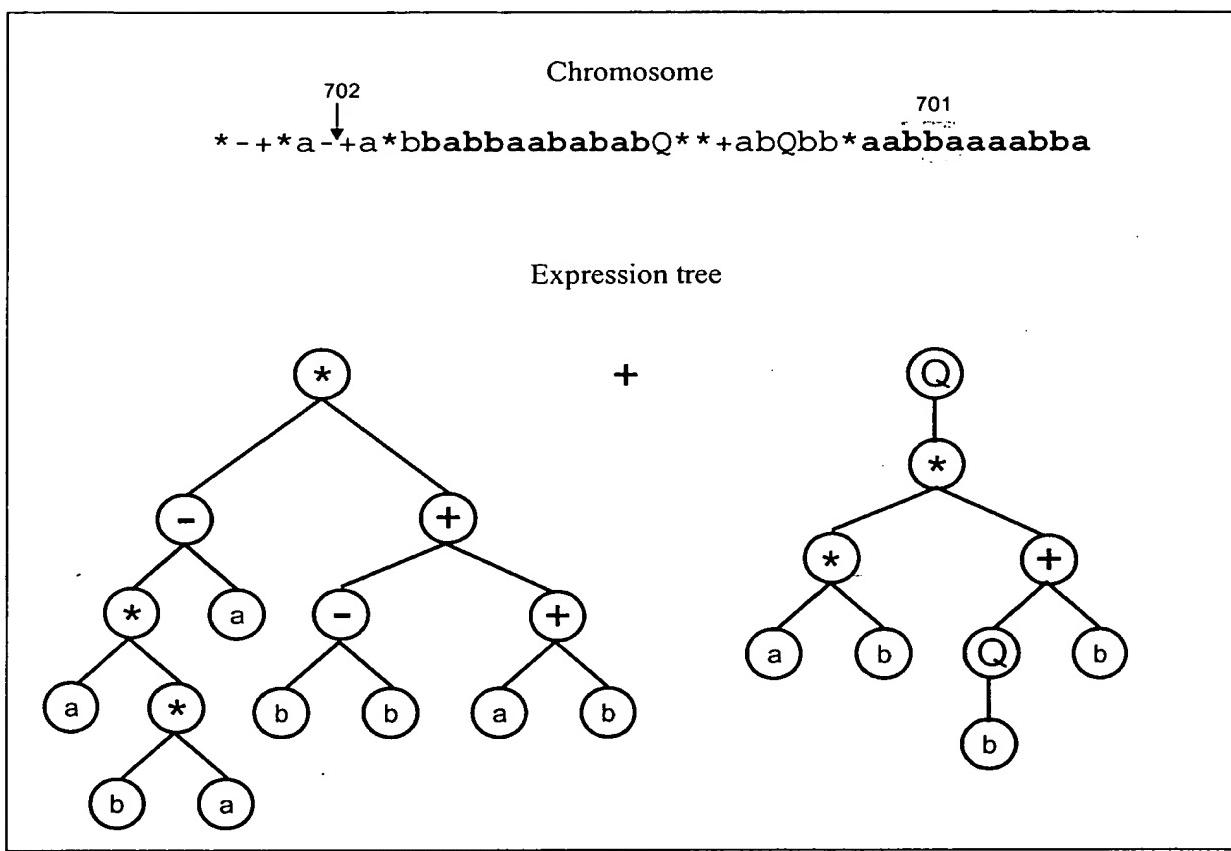


FIG 8

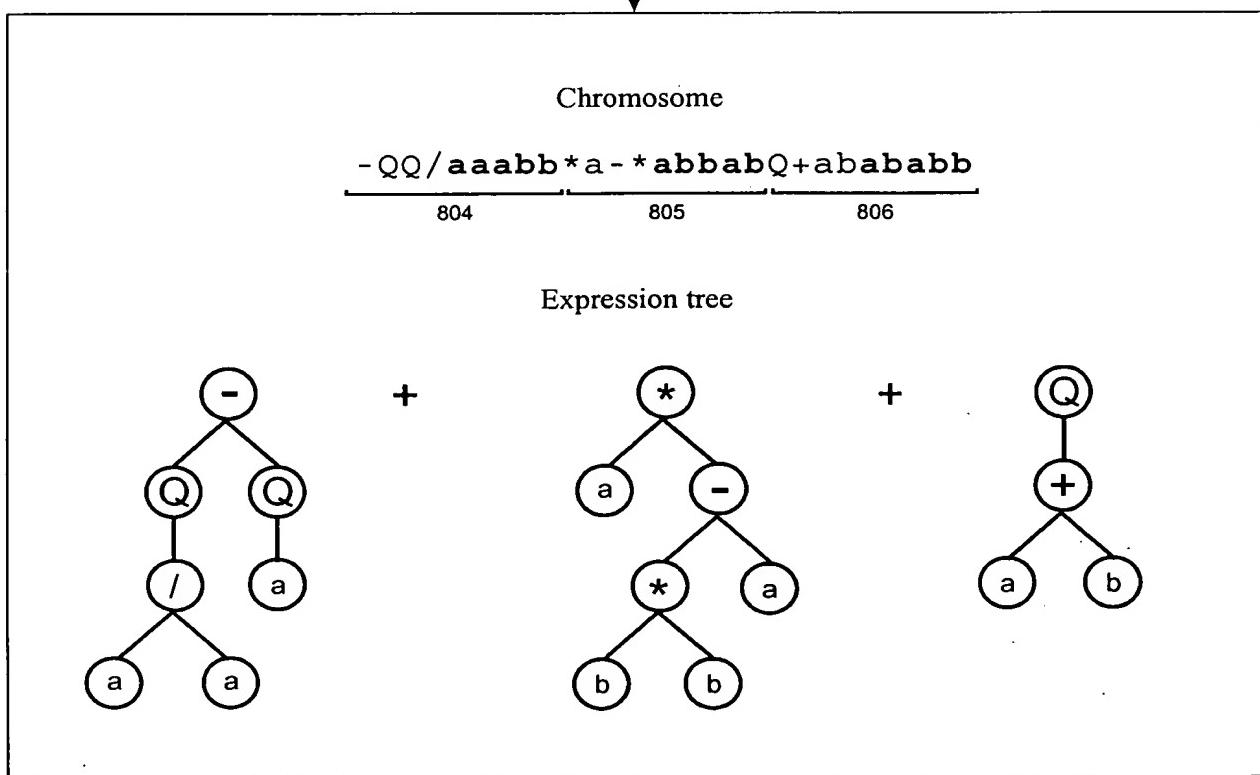
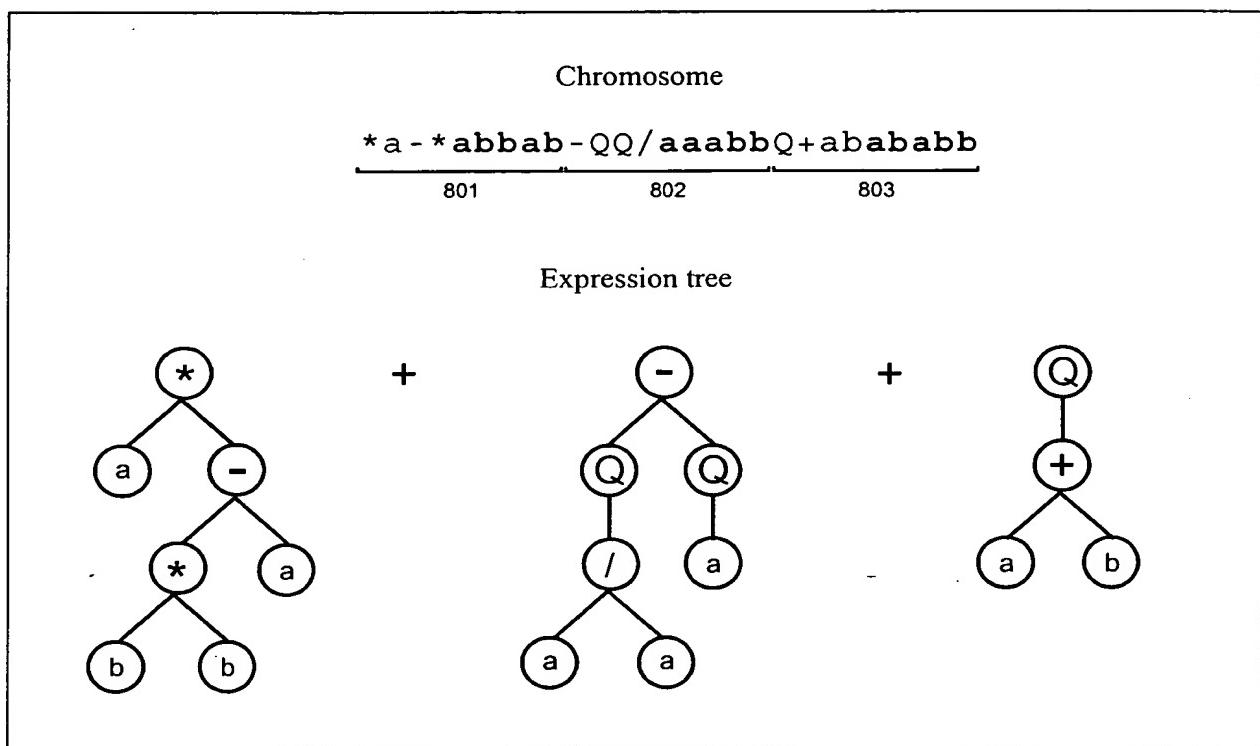


FIG 9

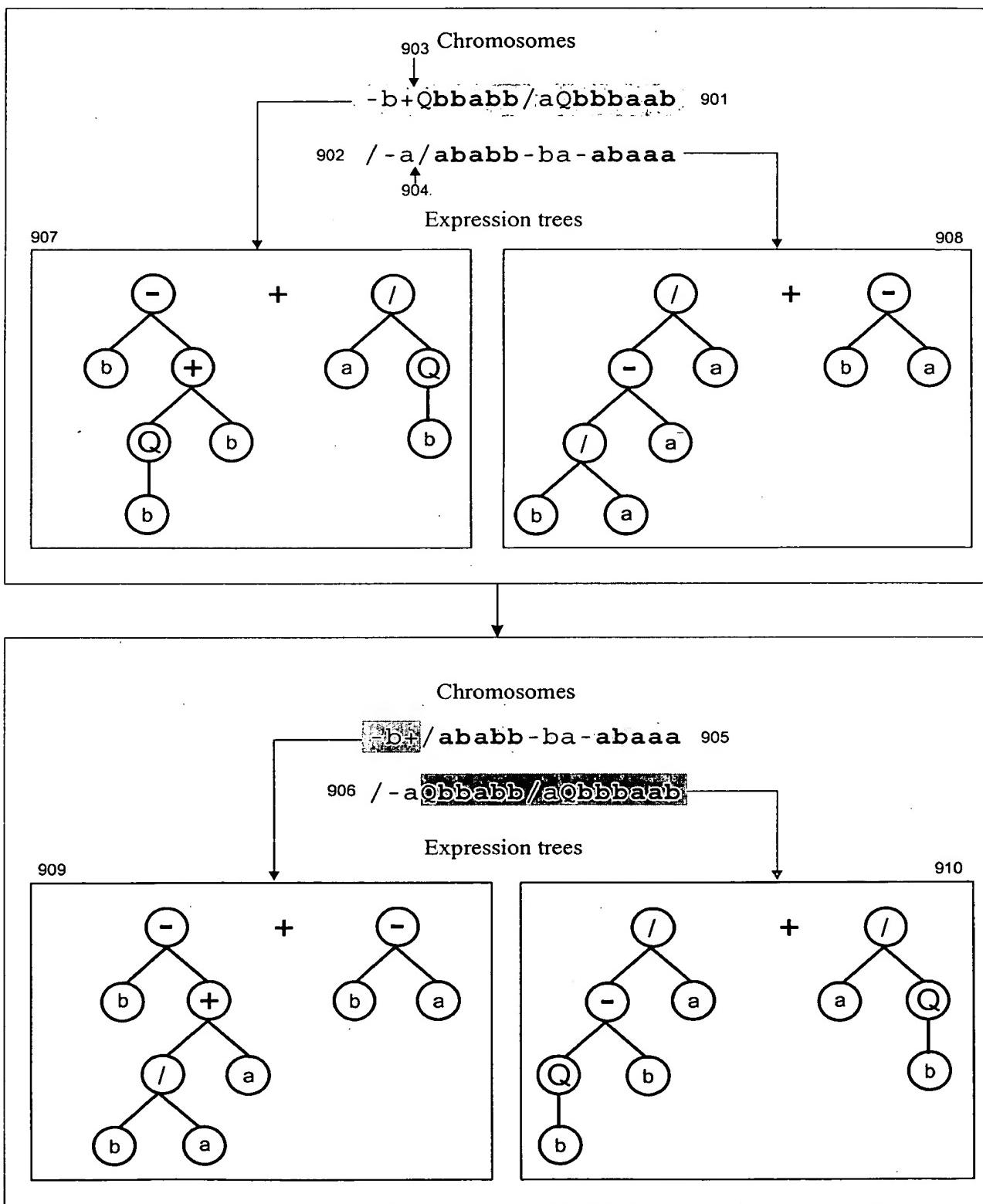


FIG 10A

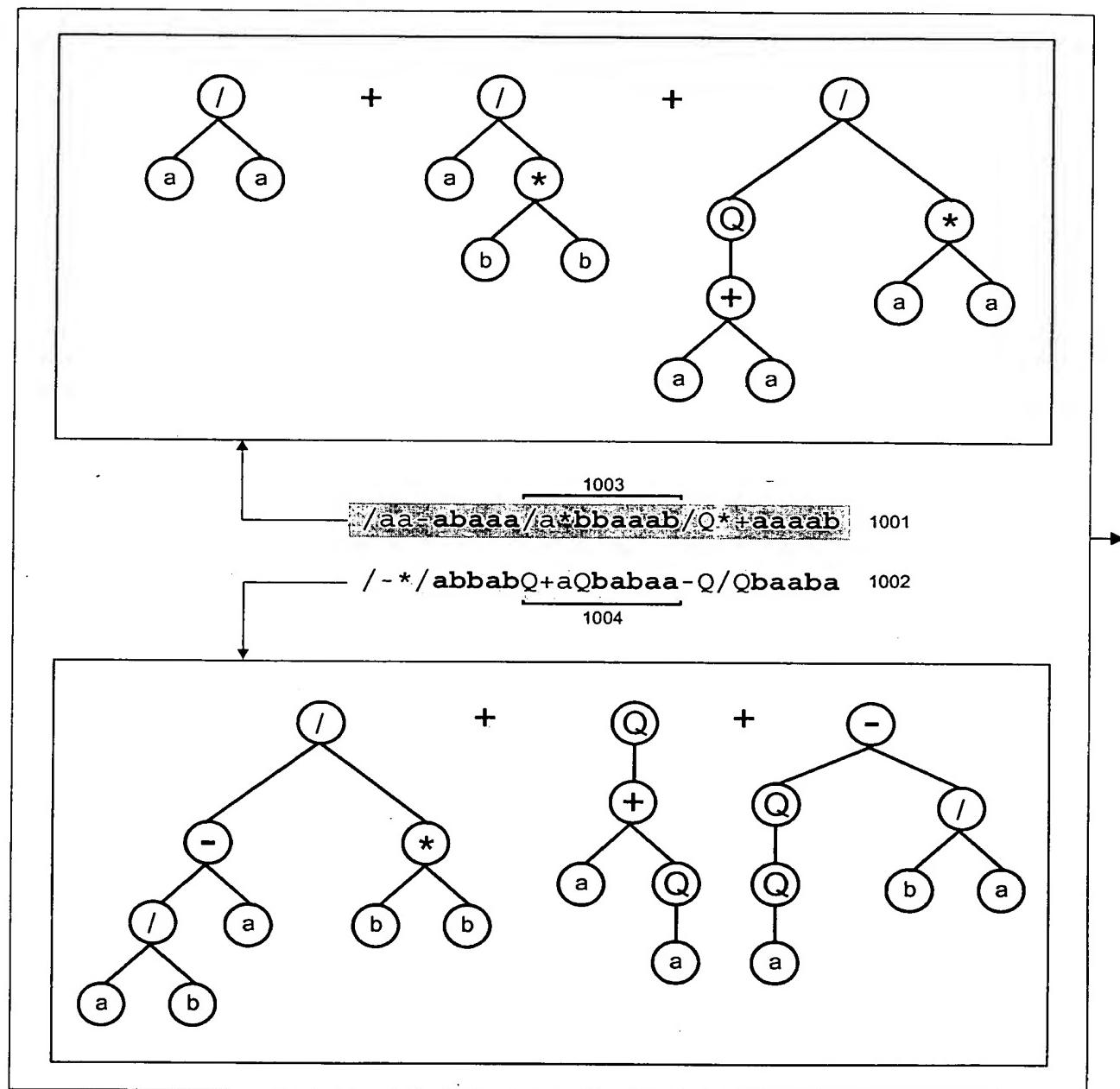
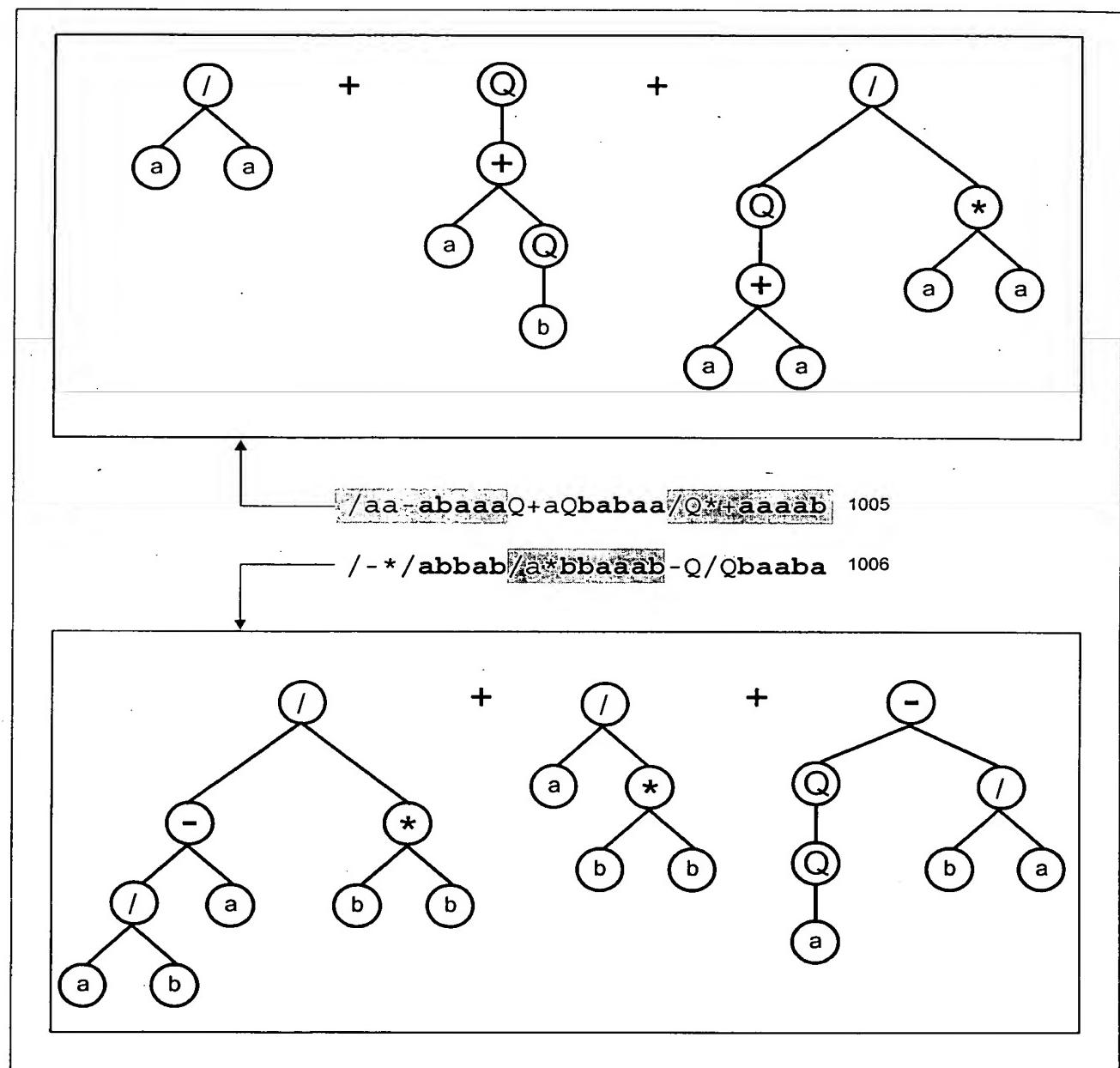


FIG 10B



**FIG 11**

1101	Chromosomes	Fitness
	//*/ -aaaaaaaa----+aaaaaaaa*+**+aaaaaaaa*++-aaaaaaaa-[ 0]	= 0
	//+//aaaaaaaa+/*+/aaaaaaaa*-a-*aaaaaaaa-a**+aaaaaaaa-[ 1]	= 0
	+a**+aaaaaaaa+-++-aaaaaaaa*---aaaaaaaa*+**-aaaaaaaa-[ 2]	= 73.35578
	+**a*-aaaaaaaa/+-a/aaaaaaaa-/+**aaaaaaaa**/-aaaaaaaa-[ 3]	= 0
	/+/**aaaaaaaa/a/++aaaaaaaa+/aa+aaaaaaaa*/-/aaaaaaaa-[ 4]	= 26.6697
	++/- -aaaaaaaa/-*/aaaaaaaa*+**aaaaaaaa/a*a-aaaaaaaa-[ 5]	= 0
	+**//aaaaaaaa-*a*aaaaaaaa-/ *//aaaaaaaa/++/*aaaaaaaa-[ 6]	= 25.44238
	*--*-aaaaaaaa+a**aaaaaaaa-a**aaaaaaaa/-*-aaaaaaaa-[ 7]	= 0
	-*a+-aaaaaaaa**a**aaaaaaaa+*-a-aaaaaaaa//+++aaaaaaaa-[ 8]	= 22.67557
	/++-+aaaaaaaa*a/*+aaaaaaaa/aa*+aaaaaaaa-* /a-aaaaaaaa-[ 9]	= 0
	*+a/+aaaaaaaa*++/-aaaaaaaa*+/* /aaaaaaaa-*a--aaaaaaaa-[ 10]	= 35.0658
	-+a-*aaaaaaaa*+**/aaaaaaaa-+/-aaaaaaaa*a/+ /aaaaaaaa-[ 11]	= 97.6903
	/aa**aaaaaaaa*+//aaaaaaaa/*a**aaaaaaaa+***/aaaaaaaa-[ 12]	= 45.73774
	*-a-aaaaaaaa+-*/aaaaaaaa*-+*-aaaaaaaa--a-aaaaaaaa-[ 13]	= 0
	+**/-aaaaaaaa-*a/aaaaaaaa*/- /aaaaaaaa/++-aaaaaaaa-[ 14]	= 0
	+**//aaaaaaaa*///aaaaaaaa/a-aaaaaaaa---+*aaaaaaaa-[ 15]	= 0
	/aa--aaaaaaaa-+*- /aaaaaaaa+*a/aaaaaaaa-/a++aaaaaaaa-[ 16]	= 7.7575
	++*- -aaaaaaaa+*+ -aaaaaaaa+ a-+*aaaaaaaa/a-*aaaaaaaa-[ 17]	= 0
	++**+aaaaaaaa/-+*-aaaaaaaa-*a/ +aaaaaaaa*+*- *aaaaaaaa-[ 18]	= 0
	+a-+*aaaaaaaa/a+/aaaaaaaa//+*-aaaaaaaa*/a*/aaaaaaaa-[ 19]	= 0
	--a+-aaaaaaaa*aaa/aaaaaaaa+ -*/ /aaaaaaaa*a+/ -aaaaaaaa-[ 20]	= 21.5497
	/++**aaaaaaaa+ +a+/aaaaaaaa*+ - -aaaaaaaa/ +*a+aaaaaaaa-[ 21]	= 18.06512
	/+aa-aaaaaaaa+ +// *aaaaaaaa*a+ - /aaaaaaaa-* / -aaaaaaaa-[ 22]	= 17.4636
	/-/+ -aaaaaaaa/-+*+aaaaaaaa/a/- *aaaaaaaa+ - *+aaaaaaaa-[ 23]	= 0
	++*- *aaaaaaaa/*a- *aaaaaaaa/-+ -aaaaaaaa+/-*/aaaaaaaa-[ 24]	= 27.9458
	-/- -aaaaaaaa-+a*aaaaaaaa+ + + -aaaaaaaa-+ /aaaaaaaaa-[ 25]	= 0
	++ -aaaaaaaa+ / +aaaaaaaa- *a/*aaaaaaaa+ * -a/aaaaaaaa-[ 26]	= 18.2736
	- *+a+aaaaaaaa/- / +aaaaaaaa**aa*aaaaaaaa/- /a-aaaaaaaa-[ 27]	= 80.0881
	/-+ -aaaaaaaa*+/- /aaaaaaaa/-+ *aaaaaaaa/- *+aaaaaaaa-[ 28]	= 0
	+ -*/ /aaaaaaaa- * -+aaaaaaaa//a/ +aaaaaaaa*a+/ +aaaaaaaa-[ 29]	= 31.31912

Chromosome number

FIG 12

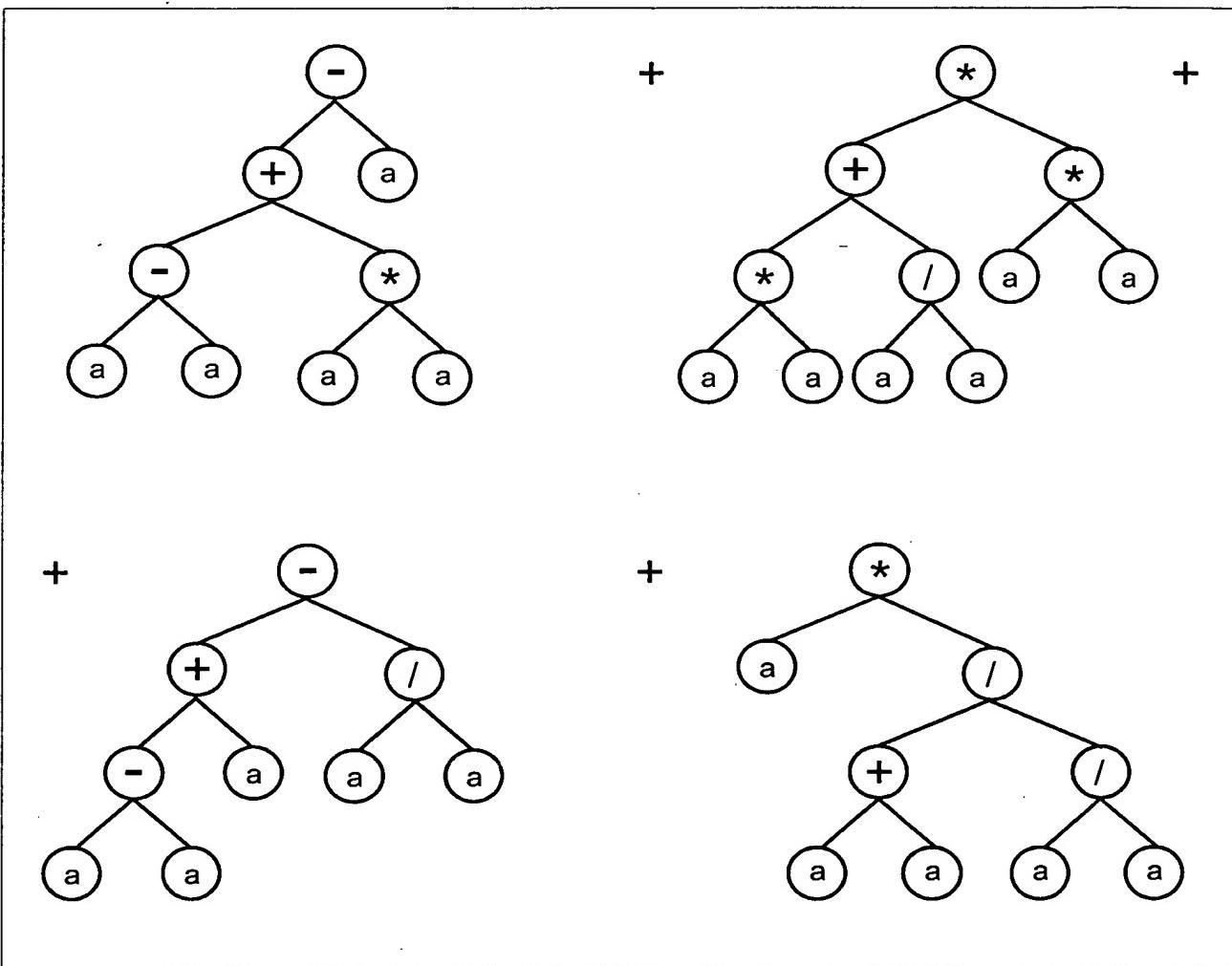
Chromosome

1201

- + a - \* aaaaaaa \* + \*\* / aaaaaaa - + / - aaaaaaaaa \* a / + / aaaaaaa

Expression tree

1202



Mathematical expression

1203

$$y = (a^2 - a) + (a^4 + a^2) + (a - 1) + (2a^2) = a^4 + 4a^2 - 1$$

FIG 13

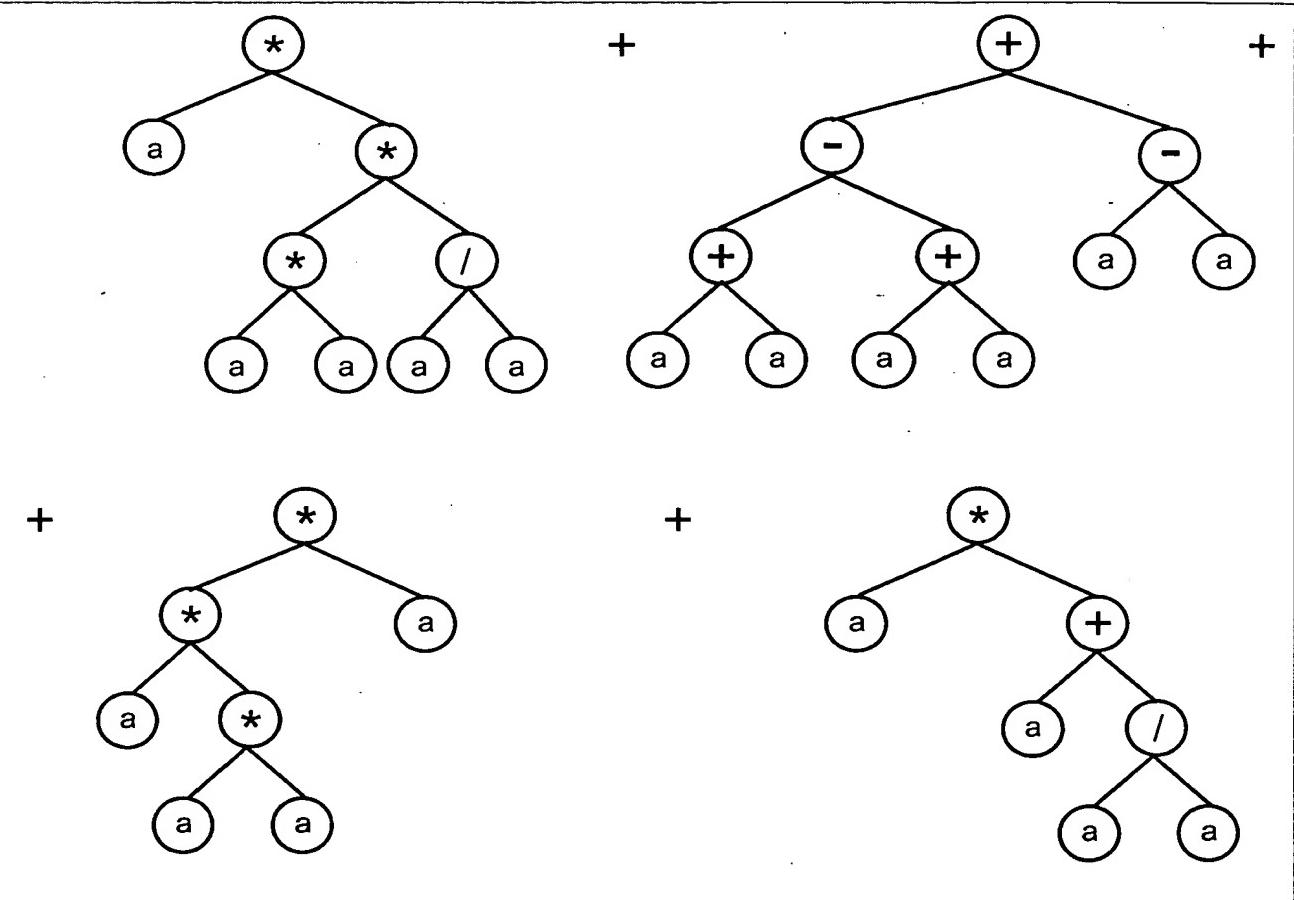
Chromosome

1301

\*a\*\*/aaaaaa+--++aaaaaa\*\*aa\*aaaaaa\*a+a/aaaaaa

Expression tree

1302



Mathematical expression

1303

$$y = (a^3) + (0) + (a^4) + (a^2 + a) = a^4 + a^3 + a^2 + a$$

**FIG 14**

	Present Invention	Genetic Programming
G	50	51
P	30	500
C	10	20
P <sub>s</sub>	1	0.35
R <sub>z</sub>	1	11
F <sub>z</sub>	15,000	5,610,000

## FIG 15

### Fitness cases' stacks

```
luaine###-0
unervsi##-1
auvse####-2
nalvuesri-3
s#####-4 1501
sluavn##-5
esiv#####-6
narsv###-7
vlera###-8
#####-9 1502
```

1503	Chromosomes	Fitness
	ApAAtuputCuRuputptAttCptuu-[ 0]	= 1
	ARRpttutpAAupupuupNCRNuttu-[ 1]	= 0
	CCRAptttCApNuptppRNAAttput-[ 2]	= 1
	ANpNttuptCARptutuuNRpAttut-[ 3]	= 1
	ARCRpptuRuuAppptpAttputup-[ 4]	= 1
	ApuApuuutAACutupuACNptppu-[ 5]	= 0
	RARuputppCACApptupRRCNttutu-[ 6]	= 0
	AtAuppppuCuAtppptuNACAttpp-[ 7]	= 1
	NtNAuputpACutppptuCuCRptppu-[ 8]	= 0
	NtANpptutAuRptpppuRpNAutupu-[ 9]	= 1
	AuututtuRptRpttuRAARutupt-[10]	= 0
	CpNRTuuupCCCNpupptRptCuptuu-[11]	= 2
	RACAuptutCACTutuupNRTNptput-[12]	= 1
	AApNuuttpANCuptutuRCAutptup-[13]	= 0
	CtCututtuCAAAutptuANRNuttpt-[14]	= 0
	CAAptputtCATNutppuAtpAtutut-[15]	= 1
	NpAAuppuAAAuptpuuAttRtputt-[16]	= 1
	AARtttuuuNAARtpuuuAutuutptp-[17]	= 1
	ApRAtutptNNAAppppuACTRptuup-[18]	= 0
	AAAppppputRNACupptpACNttuptu-[19]	= 0
	CpRNppppuACANTtuttNAAAputp-[20]	= 2
	AtNAututtAupttuupARRCtuppp-[21]	= 0
	CAAAtputuAtANptpupAAptpuuut-[22]	= 1
	ARNRtuuupApAttputApRNupuut-[23]	= 0
	RtNNtpuppCtAuuuppuCAANpuutu-[24]	= 0
	RCAtuupttAutAptutpAAAtAttuu-[25]	= 0
	RtuAuputtAAApptutRpRpptpuu-[26]	= 1
	CpAAtputuCCpNpttutAuuRppupt-[27]	= 2
	AACRtpupuRuAAttuptCAuuppuuu-[28]	= 2
	RuAAputtuRACNuupptAuRppuupp-[29]	= 2

Chromosome number

## FIG 16

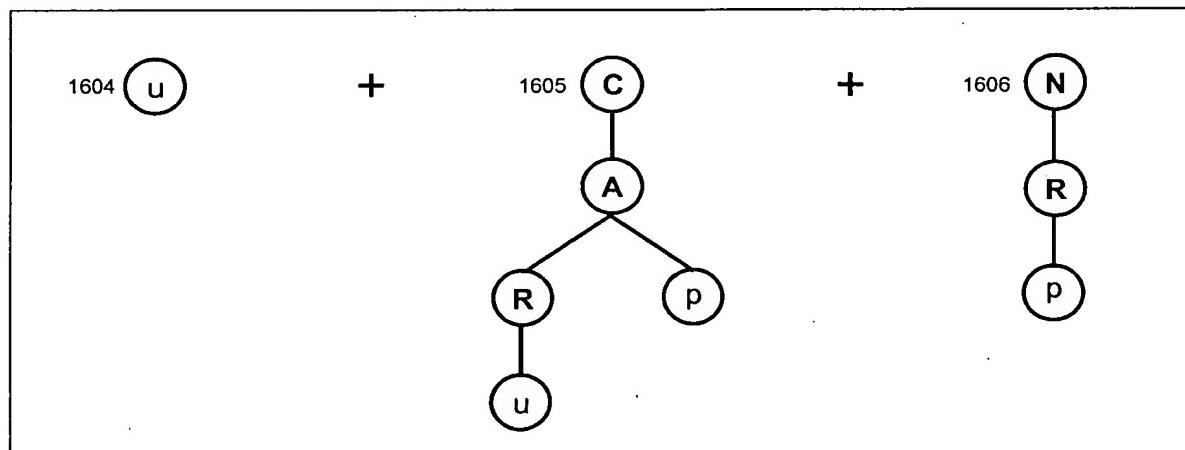
Fitness cases' stacks

1601      rilasnvu#-0  
              rls#####-1  
              anruievls-2  
              nr#####-3  
              viaslre##-4  
              ievlanru#-5  
              uenari###-6      1602  
              neai####-7  
              li#####-8  
              #####-9

1603      Chromosome

uNpNttuptCARpuutupNRpCtutut

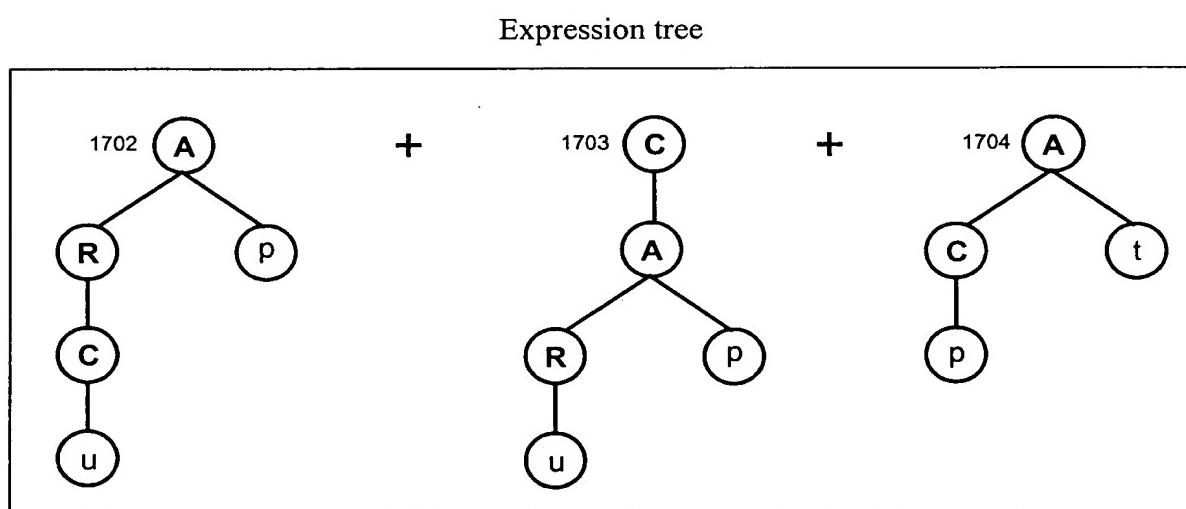
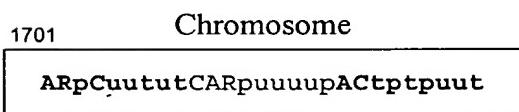
Expression tree



## FIG 17

Fitness cases' stacks

```
s#####-0
vulnsiae-1
iuvr#####-2
riev#####-3
ui#####-4
isunrl###-5
uniav#####-6
lireav###-7
ni#####-8
#####-9
```



## FIG 18

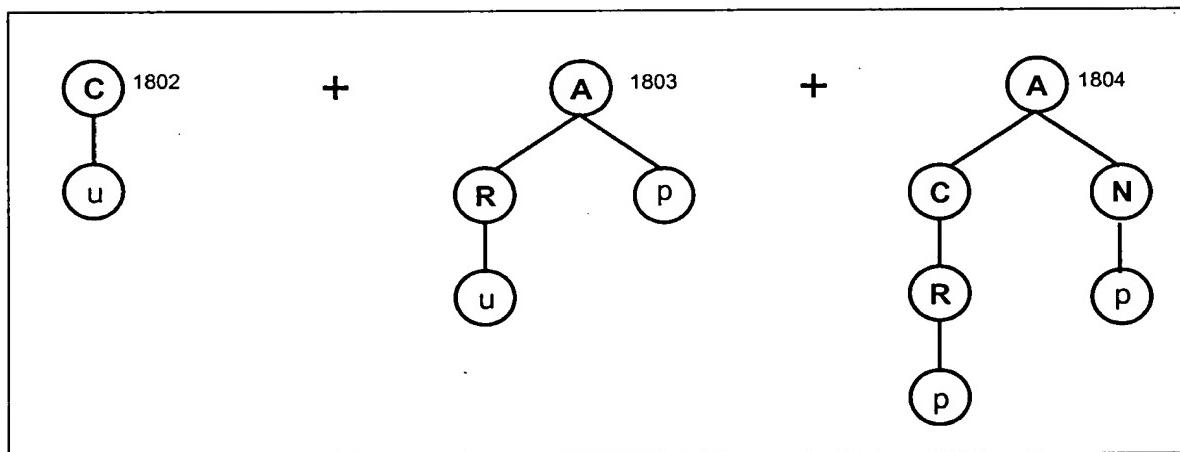
Fitness cases' stacks

```
avnurle##-0
vsrui####-1
uerlvsnai-2
saelnu###-3
linv#####-4
sivnrlaeu-5
vulrsaine-6
esla#####-7
vnarlsei#-8
#######--9
```

1801 Chromosome

```
CutputuptARpuuuttpACNRppuuu
```

Expression tree



**FIG 19**

	Present Invention	Genetic Programming
G	100	51
P	30	500
C	10	167
P <sub>s</sub>	0.70	0.767
R <sub>z</sub>	4	4
F <sub>z</sub>	120,000	17,034,000

0908962883209000

FIG 20

2001

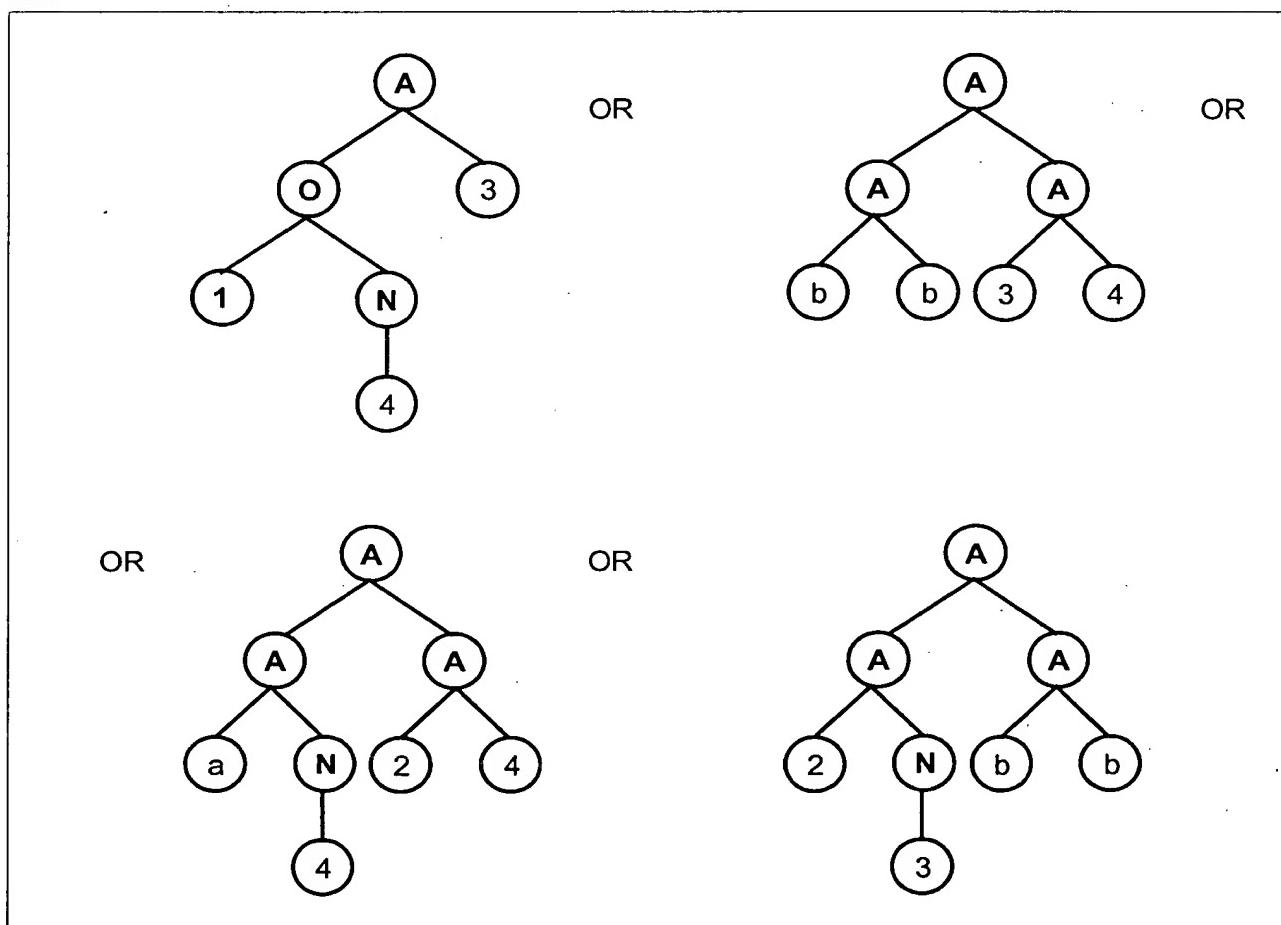
Chromosome

Fitness

AO31N4322a4AAAbb342444AAAaN244bb3AAA2Nb3a1b = 44

2002

Expression tree



DRAFT - DO NOT CITE

FIG 21

2101

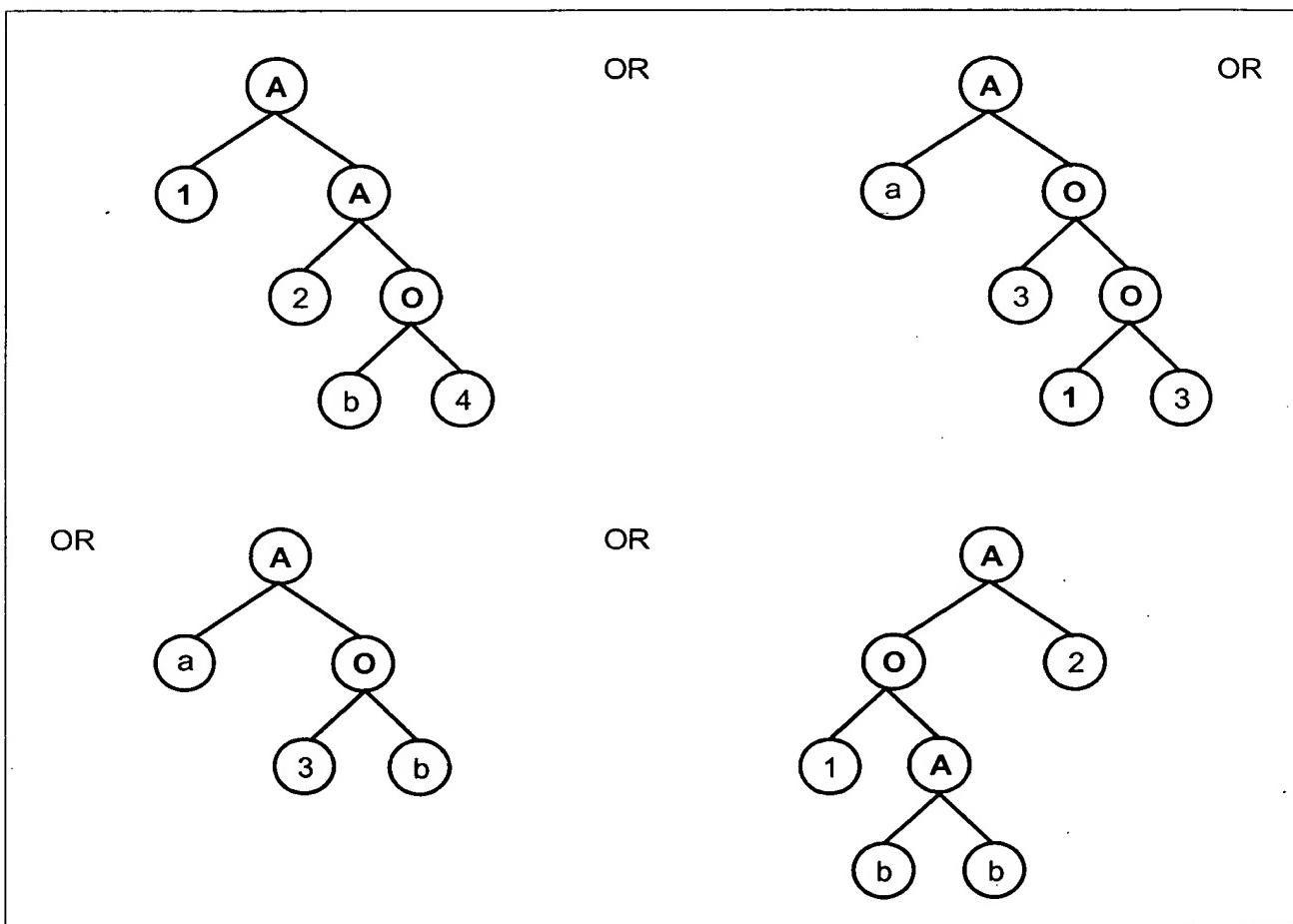
## Chromosome

## Fitness

A1A2Ob4443aAaO3O133311AaO3bbbb322AO21Abb4a33 = 132

2102

## Expression tree



**FIG 22**

2201	Chromosome	Fitness
AOOOAa21b3aAaO33133311AaN31bb4321AON1Abb4a3b	=	216

2202

## Expression tree

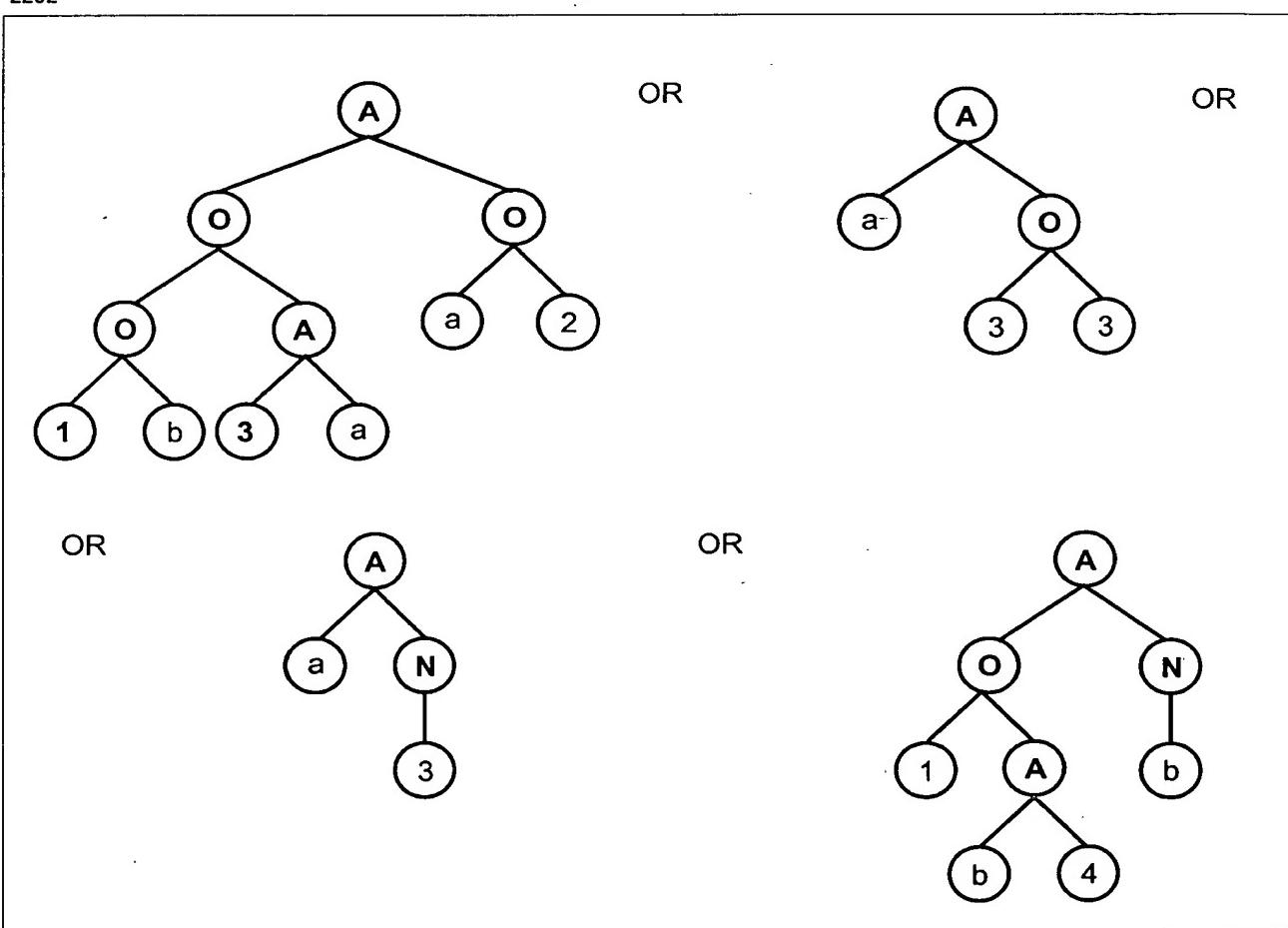


FIG 23

2301

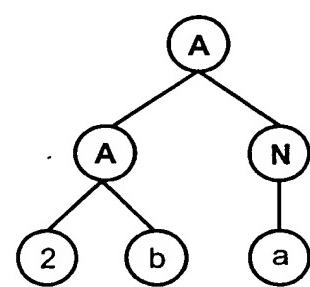
Chromosome

Fitness

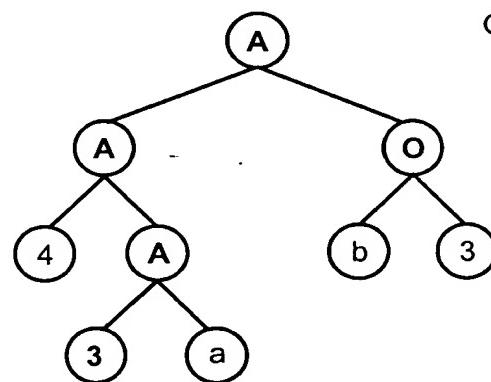
AAN2baa4b2bAAO4Ab33a31AaANA3b4312AON1bb1b233 = 310

2302

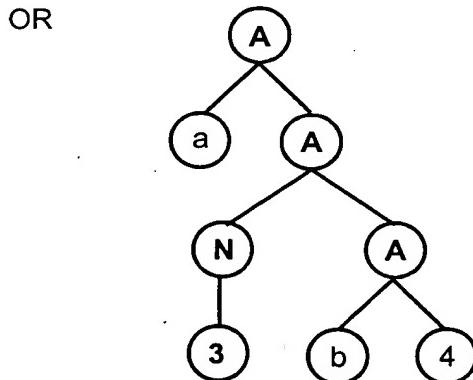
Expression tree



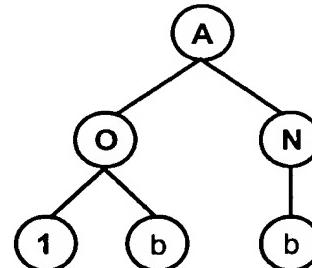
OR



OR



OR



09896282 \* 020600

FIG 24

2401

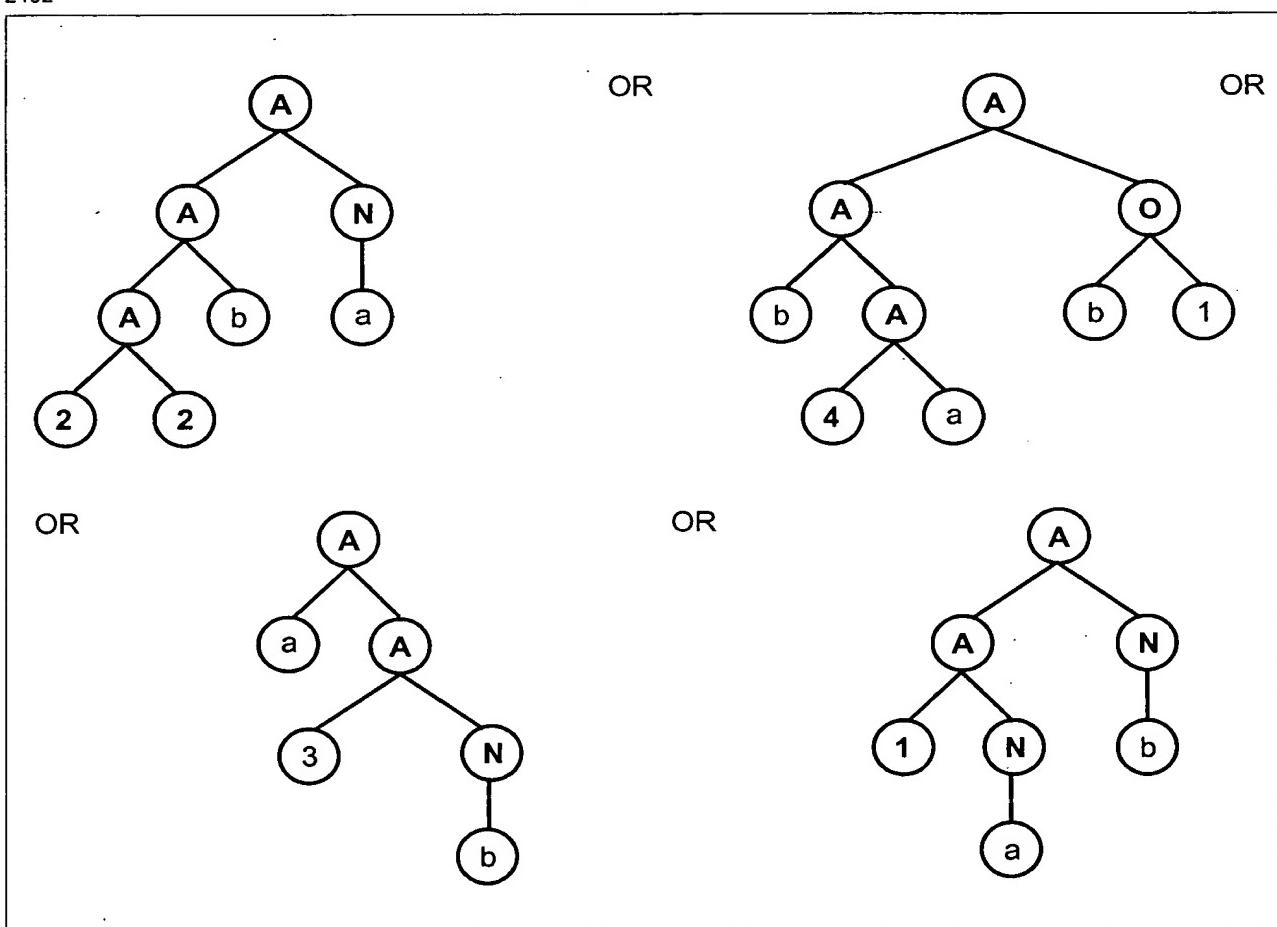
Chromosome

Fitness

AANAbaba22a41AAObAb14a2bAaA3Nb1111AAN1Nb2a2b = 400

2402

Expression tree



098962810 = DECODE